Issued July 22, 1914.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE UNIVERSITY OF MISSOURI AGRICULTURAL EXPERIMENT STATION, F. B. MUMFORD, DIRECTOR.

SOIL SURVEY OF MILLER COUNTY, MISSOURI.

BY

H. G. LEWIS, OF THE UNIVERSITY OF MISSOURI, AND
F. V. EMERSON, OF THE U. S. DEPARTMENT OF AGRICULTURE.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1914.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., December 29, 1913.

SIR: In the extension of soil survey work in the State of Missouri work was undertaken in Miller County during the field season of 1912. This work was done in cooperation with the University of Missouri Agricultural Experiment Station, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1912, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

CONTENTS.

	Page.
SOIL SURVEY OF MILLER COUNTY, MISSOURI. By H. G. LEWIS, OF THE UNIVERSITY OF MISSOURI, and F. V. EMERSON, OF THE U. S. DEPARTMENT OF AGRICULTURE	5
Description of the area	5
Climate	7
Agriculture	9
Soils	12
Eldon silt loam	15
Clarksville gravelly loam	16
Clarksville silt loam	17
Clarksville stony loam	19
Lebanon silt loam	20
Tilsit fine sandy loam	21
Huntington silt loam	22
Huntington fine sandy loam	24
Robertsville silt loam	24
Bagnell clay	25
Riverwash	26
Summary	26

ILLUSTRATIONS.

FIGURE.

	Page.
FIG. 1. Sketch map showing areas surveyed in Missouri	5

MAP.

Soil map, Miller County sheet, Missouri.

SOIL SURVEY OF MILLER COUNTY, MISSOURI.

By H. G. LEWIS, of the University of Missouri, and F. V. EMERSON, of the U. S. Department of Agriculture.

DESCRIPTION OF THE AREA.

Miller County is situated near the central southern part of the State of Missouri, about 30 miles south of Jefferson City, 130 miles east of Kansas City, and 150 miles west of St. Louis. It has an extreme width and length of about 27 miles, and an area of 593 square

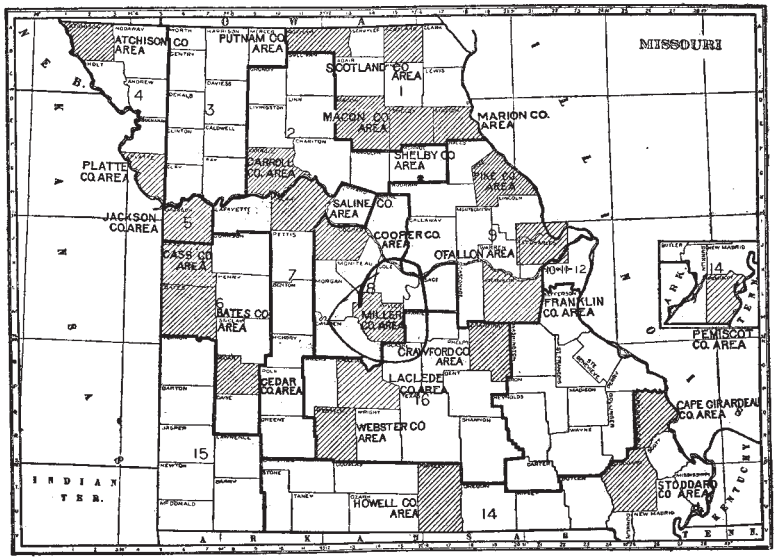

FIG. 1.—Sketch map showing areas surveyed in Missouri.

miles, or 379,520 acres. It is bounded on the north by Moniteau and Cole Counties, on the east by Osage and Maries Counties, on the south by Pulaski and Camden Counties, and on the west by Camden and Morgan Counties. The county lies well within the Ozark region.

As a whole the county is a plateau well dissected by valleys. A plane touching the hilltops would rise from an altitude of about 750 feet in the northern part to nearly 1,000 feet along the southern boundary. The county comprises two contrasting topographic regions: (1) the "river breaks," or hilly country along the Osage and its main tributaries, and (2) the gently rolling to rolling and much smoother northern and central southern sections, locally referred to as the "prairie." Through the central part of the county, along the Osage, is a belt of hilly country with an average width of about 12 miles.

Here near the river erosion has been so active that the surface is cut into hills and ridges. Most of the arable land and dwellings in this belt are in the valleys.

The smooth northern section extends northward from an irregular line between Rockymount and Marys Home. This section constitutes the divide between the drainage of the Moreau and the Osage. As the Osage tributaries have by far the steeper grades, they are vigorously eroding this upland from the south. The break from the smoother northern prairie section to the much rougher country within the zone of the Osage tributaries is sudden, the line of separation being plainly marked.

In the "prairie" section the land is dominantly gently rolling or rolling, the eminences having rounded outlines and gentle slopes. A large proportion of this country is susceptible of cultivation.

The uplands in the southern part of the county are prevailingly much rougher than the comparatively small area comprised within the smooth or prairie portions. Here stones are more abundant, the slopes are steeper, the ridges sharper, the valleys deeper and much more numerous, and a much smaller proportion of the area is suited for farming. Portions of this southern section, such as the country around Iberia, are not so rough.

The northern uplands are drained by the Moreau, and the rest of the county by the Osage and its tributaries. The Osage rises in east-central Kansas and in Miller County is navigable for eight or nine months of the year. The flat-bottomed valley along this stream is inclosed by bluffs or steep slopes which rise on each side from 20 to over 200 feet. It averages three-fourths of a mile in width.

The Little Gravois, Saline, and Cub Creeks are important tributaries of the Osage from the north; from the south are Bear, Dog, and Big Tavern Creeks, the latter being the most important tributary in the county. Grandglaize Creek, an important tributary, flows a short distance through the southwestern part of the county. These tributaries, and most of the larger streams, have flat-bottomed valleys in their lower courses. The upper parts of the valleys are V-shaped. The smaller streams are usually intermittent. The Moreau Valley differs from that of the Osage in being wider and having gentle slopes leading up to the uplands on either side.

Abundant well water is found in the uplands at depths of less than 100 feet. On the slopes and in the valleys are numerous fine springs, especially near outcrops of sandstone.

In the settlement of Miller County the Osage was an important means of communication, not so much for immigration as for the export of furs, hides, and other products seeking market. The first settlers were trappers and hunters, and these industries were combined with agriculture for several generations, until the fur supply

was practically exhausted. Miller County was formed from parts of Cole and Pulaski Counties in 1837.

The first settlements were made on the prairie of the northern part and along the Osage and its tributaries. It was not until the early fifties that agriculture became a factor in the industries of the county. Wheat, corn, flax, and hemp were the principal crops. During the fifties there was a considerable influx of settlers, mainly from Tennessee, Kentucky, and Virginia, when the population reached 3,854. More recently a considerable body of immigrants of German extraction have come from eastern counties and settled around Marys Home and St. Elizabeth. The population in 1910 was 16,717, a gain of 10 per cent in 10 years. Eldon is the chief town and a division point on the Chicago, Rock Island & Pacific Railroad. Tuscumbia, situated on the Osage River, is the county seat. Iberia is the distributing center for the southern part of the county.

In the early eighties a branch of what is now the Missouri Pacific Railroad was built through the northern part of the county to Bagnell, and within the last 10 years the main line of the Chicago, Rock Island & Pacific Railroad has been built through the northern tier of townships. The northern part of the county is well enough supplied with railroads, but the southern, as a whole, is far from railroad markets. A line of the Frisco system passes several miles south of the county line, but the distance to shipping points is one of the main drawbacks to the development of the southern part of the county.

The principal wagon roads usually follow the ridges and are fairly good, but the valley roads are frequently in poor condition. To some extent the roads on the upland follow land lines, but more frequently they follow the boundary between the upland and the broken country. Generally the roads are in poor condition, although in recent years considerable improvement has been made in some localities. There is abundant material for surfacing the beds, such as stream gravel and the cherty subsoil material of the uplands.

CLIMATE.

Miller County has a distinctly humid climate. The precipitation is relatively light from October to March, and is heaviest from April to September, during the crop-growing season.

The average annual rainfall is 42.41 inches. In the driest year the precipitation amounted to 22.52 inches, and in the wettest year 50.4 inches. The rainfall is fairly well distributed over the late spring, summer, and early fall months, and although droughts of three to four weeks' duration are frequent, nearly all the soils, if properly handled, are able to carry crops through such periods without serious injury. The winters are rather mild. Snowfall is never very great, though sufficient to protect the wheat.

The data regarding frost occurrence indicate an average growing season of 179 days, which is ample time for the maturing of all farm crops. Stock can ordinarily graze from the last of April to December and often through the winter months.

The prevailing winds are from the south and southwest and most of the rains come from the west or southwest.

By reason of its elevation, excellent water supply, and drainage, Miller County has a very healthful climate.

As the climatological data for Miller County are incomplete, that for precipitation only being available, additional information, which may be considered as representative of local conditions, including rainfall, temperature, and frost, are taken from the records of the Weather Bureau station at Columbia, Boone County, lying about 45 to 50 miles north of Miller County.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation and frost data at Columbia, Boone County, and the precipitation at Eldon, Miller County:

Normal monthly, seasonal, and annual temperature and precipitation and frost data at Columbia, Boone County, and precipitation at Eldon, Miller County.

Month.	Temperature.			Precipitation, Columbia.			Precipitation, Eldon.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
December	32.9	75	−23	1.70	2.29	2.28	2.50	3.75	1.16
January	27.2	74	−16	2.46	2.32	2.27	2.07	1.40	3.72
February	30.1	76	−26	2.18	1.79	6.80	2.75	2.59	2.04
Winter	30.1	.....	.....	6.34	6.40	11.35	7.32	7.74	6.92
March	41.4	92	−6	2.91	3.25	3.50	3.62	3.79	7.62
April	54.3	90	18	3.88	2.38	5.60	4.71	2.30	3.43
May	64.5	91	28	4.83	0.35	10.58	5.12	0.36	6.91
Spring	53.4	.....	.....	11.62	5.98	19.68	13.45	6.45	17.96
June	74.5	104	42	4.86	1.23	3.60	5.11	0.67	4.03
July	77.4	111	45	4.08	2.74	7.62	4.69	0.68	3.91
August	74.7	105	42	3.58	1.67	3.56	4.05	2.39	2.44
Summer	75.5	.....	.....	12.52	5.64	14.78	13.85	3.74	10.38
September	67.8	104	26	3.84	1.37	4.50	3.35	1.09	6.75
October	54.8	95	19	2.16	1.16	1.87	2.12	2.12	5.21
November	42.4	80	5	2.15	0.80	2.44	2.32	1.38	3.18
Fall	55.0	.....	.....	8.15	3.33	8.81	7.79	4.59	15.14
Year	53.5	111	−26	38.63	21.35	54.62	42.41	22.52	50.40

Average date of first killing frost in fall, Oct. 14; of last in spring, Apr. 18. Earliest date of killing frost in fall, Sept. 18; date of latest in spring, May 9.

AGRICULTURE.

The first settlers built their homes along the streams, and lived principally by fishing and hunting. It was not for several years after settlement that farming was practiced. Stock raising was the first industry to receive attention. The abundance of bluestem grass and other native forage plants afforded ample pasturage. In conjunction with live stock raising, small fields were planted with corn, or sowed with wheat, oats, and hemp. The surplus from these crops was fed to hogs and cattle. The markets for the region were at Jefferson City and St. Louis. Supplies were freighted overland or brought by flatboats up the Osage River. Live stock and furs were the principal products sent out from the county.

This system of agriculture continued and made steady growth until immigration was checked and all industry unsettled by the Civil War, at the close of which the farms had grown up with brush and were generally in a dilapidated condition.

The early methods of cultivation were very crude. Oxen were used for hauling and plowing. Corn was dropped by hand and very little work was done with machinery. With the building of the St. Louis & San Francisco Railroad through Pulaski County on the south, and of the Bagnell Branch of the Missouri Pacific Railway through the northern part of the county, agriculture received a new stimulus. Markets were brought within easy reach. New settlers came and soon the bottom lands were all taken up and settlers were forced to take up the ridge land and the narrow alluvial areas along the smaller streams.

Approximately 40 per cent of the area of the county is now under cultivation, the remaining 60 per cent being in forest. The greater part of the land fit for farming has been cleared. The stony loam soils as a rule are all timbered, and about 45 per cent of the lands of the county is nonagricultural, on account of its rough, broken, and stony character. The most extensive area of such land is found along the Osage River and in the belt of country known as the "breaks." Black oak, white oak, blackjack oak, post oak, hickory, elm, and walnut form the principal part of the forests. The growth on the rough, stony land is stunted and is principally blackjack and post oak. The making of railroad ties has been the important timber industry of the county, Bagnell being the largest shipping point for ties.

The cost of clearing the forested land and getting it ready for cultivation varies from $4 to $8 an acre. The trees are cut, piled, and burned. Sprouts grow from the stumps year after year, and where the land is used for pasture often are cut from 6 to 8 times before the roots die. This costs as much as the original clearing.

Land that is put under cultivation ceases to grow sprouts in less time, as the roots and stumps rot much faster. Abandoned fields grow up in sassafras and persimmon brush, which covers the entire surface in a short time if not cut.

About 70 per cent of the farms of the county are operated by their owners. Within the last few years tenant farming has increased somewhat. Both the share and cash systems of rental are practiced. Cash rents vary from $2 to $6 an acre. On the basis of shares, the landlord receives from one-third to one-fourth of the crops. Most of the labor is done by owners or tenants, as farm laborers are scarce.

According to the census of 1900 the total number of farms in Miller County was 2,251, and the average size 123.3 acres. Most of the land is fenced with woven or barbed wire. There is no longer any free range for stock. Land values range from merely nominal figures to $75 or $100 an acre, the price depending on the agricultural value and the proximity to railroads and towns. As a whole the farming land is cheap.

The best farm buildings, fences, and farm improvements are to be found in the northern part of the county in the prairie region and in the southern prairie region around Iberia. Along the Osage River and the larger tributaries the farms and buildings are good. In the rough, broken country, however, near the Osage River and other streams, very little of the land is farmed, except along the small draws. Here the improvements are not so good as elsewhere. The buildings on the Clarksville stony loam are usually log houses, the farms are small, and but little is grown.

At present grass, wheat, corn, and oats, named in the order of their importance, are the principal crops grown. All the soils of the region are fairly well adapted to the grasses. Bluegrass, red clover, white clover, and lespedeza (Japan clover) thrive on most of the soils and afford good pasturage. Red clover is a crop of much importance. With the decreasing fertility of the soil, the value of clover as a soil improver is being appreciated. Alfalfa is grown to a very limited extent.

In preparation for corn, land in the stream bottoms is generally broken in the spring, as early floods leave fall-plowed land in poor condition for planting. Upland areas are sometimes plowed in the fall, but spring plowing is the rule.

Of the cultivated crops corn occupies the largest acreage. Both acreage and production of this crop are increasing, the census giving the former as 35,560 acres in 1899, as against 39,975 in 1909. Corn is planted from the first of April to the first of June. The land is usually well prepared before the seed is put in. Most of the acreage is planted with the check-row planter. Cultivators are used in the friable and stone-free soils, and single or double shovel plows where

the soil is stony. The crop is cultivated from three to five times and usually laid by in July, or at the latest early in August.

A large part of the corn crop is cut and shocked, though on the prairies a considerable share of the crop is made into silage and used to feed stock. The leading varieties grown are the Boone County White, St. Charles White, and Reids Yellow Dent. The white varieties predominate.

The acreage of wheat did not increase during the decade 1900–1910, the census returns showing 17,595 acres in 1899 against 16,645 in 1909. The greater part of the wheat acreage is found in the northern and southern prairie regions, with some along the Osage River. In preparing the soil for sowing, the ground is broken in late summer or early fall. From 4 to 6 pecks are used per acre for sowing, which is done almost entirely with the drill. Phosphatic fertilizers and stable manure are used. The crop is harvested in the latter part of June. On much of the wheat land timothy is sowed in the fall and clover in the early spring. The Fultz and Mediterranean are varieties commonly grown. There has been very little trouble with the Hessian fly.

Oats are seeded with a grain drill or sown broadcast, usually upon disked corn land, the latter part of March or early in April, and are harvested in June or July. The Texas Red is a common variety. This crop is of very little importance. It is grown chiefly in the northern and southern prairie regions. The acreage has been decreased slightly in recent years.

In general, commercial fertilizers are being used more largely than formerly. Their use is extending, especially in the northern prairie section, and in the prairie region around Iberia. Bone meal and acid phosphate are reported to give good results with both wheat and corn. While the average wheat yield on land in the northern prairie section is from 15 to 20 bushels, in some experiments with bone meal as fertilizer a yield of 35 bushels per acre has been obtained. The soils as a whole are low in organic matter.

Live-stock farming is still carried on extensively, the census of 1910 reporting a valuation of $1,368,365. This amount is somewhat greater than that reported at the end of the preceding decade. According to the authority quoted, the number of farm animals in the county was as follows: Cattle, 15,787; hogs, 17,976; sheep, 7,660; horses, 6,578; and mules, 2,430. The feeding of live stock is carried on along the bottom lands and in the northern and southern prairie regions. In these regions water is plentiful and pasture lands are good. Most of the corn fed is grown locally, but there is not enough to allow very extensive feeding. Some corn is shipped in for this purpose. Many cattle are pastured during the summer and fall on the rough lands, such as the Clarksville stony loam, and then

driven to the northern counties to be fed for market. The cattle are of the beef type, consisting of the Shorthorn, Hereford, and Aberdeen-Angus breeds. The hogs are Berkshire, Poland China, Duroc Jersey, and Chester White. Shropshires and Oxford Downs are the leading breeds of sheep. Formerly farm animals were of nondescript types, but to-day most of them are well bred. So far very little dairying has been developed, owing to lack of home markets and inadequate facilities for shipping milk. Because of the large acreage of soils better adapted to the production of hay and pasturage than to any other purpose, the raising of live stock will continue the basis of local agriculture. This is realized to-day, and the production of "stockers" for shipping out is carried on extensively. The raising of horses and mules is also practiced, and the breeding and feeding of sheep is being carried on profitably.

Within the last few years several orchards of considerable size have been set out in the county. The soils seem to be well adapted to fruit growing, but the climatic conditions are not altogether favorable. The warm weather in the early part of March and April forces the buds, which are often killed by later frosts. Within the last few years a number of crop failures have occurred, especially with the peaches, and this has caused much discouragement. Smudging to protect the trees from frosts has not been tried.

As a whole the orchards are neglected and are in bad condition. Many of the orchards are badly in need of pruning. Spraying for insects or fungous diseases is seldom practiced. The varieties grown are Ben Davis, Winesap, Missouri Pippin, Huntsmans Favorite, Maiden Blush, Early Harvest, and Yellow Transparent. Over 50 per cent of the total plantings are Ben Davis. Most of the apples grown are consumed locally, though some are shipped to St. Louis.

SOILS.

The soils of Miller County are not strikingly varied in character. Especially is this true of the upland types, where the materials very largely represent residual products left upon the decay of limestone, mainly cherty limestone. A very large proportion of the county is occupied by the Clarksville soils, which have such an extensive development throughout the limestone areas of the Ozark region. The rocks from which the Clarksville soils are derived are characteristically cherty, and the resultant material over wide areas carries so much of this resistant chert that it is frequently difficult or impracticable to cultivate the land. There are beds of relatively chert-free limestone, argillaceous limestone, and some sandstone strata, but these have had only a small influence upon the soils. A compara-

tively small area of soil in the southeastern part of the county is derived from sandstone.

Under the influence of weathering, including the solvent action of water, the underlying limestone rocks have been decomposed, and a large part of their original mass, chiefly calcium carbonate, has been carried away in solution, leaving residual products consisting principally of silt and clay, and small to large fragments of relatively insoluble chert. The depth of the soil resulting from this breaking down of the underlying rocks depends largely upon the surface slope. On the smoother divides and gentler slopes the material has accumulated to depths of several feet, and where the surface is steeper, as in the valley walls and hillsides, a much larger proportion of the fine soil material has been swept away by running water. In consequence of this the smoother areas are covered with a deeper soil, much freer of rock than are the slopes, where erosion has kept closer pace with weathering.

Certain differences in the processes of weathering have given rise to important differences in the character of the soil material, but from the standpoint of texture there is little complexity, the chief types being silt loams, stony loams, and gravelly loams, the fine material of which is very closely related in so far as texture goes. The condition of drainage under which the material has existed has been an important factor in changing the character of the material, particularly in effecting differences of color. The soils of the prairie portion of the county, for example, are much darker in color than those of the forested areas. This seems to be the result, at least in part, of differences in the drainage, the prairie soils being smoother and not so excessively drained. Also, under prairie conditions organic matter from prairie grasses has been incorporated with the soil material in such a way as to give the land a darker color.

The soils of the county have been grouped into series on the basis of similarity in character of material as regards color in the surface material, character of subsoil, and origin.

The Clarksville soils are characterized by a grayish color of the surface material and by a yellow to reddish or mottled yellow and gray color of the subsoil. The fine material is mainly silt in the surface section and silty clay loam in the subsoil. Type difference in this series have been determined largely by the abundance or scarcity of chert fragments. The silt loam has comparatively little chert in the surface soil and subsoil, but in its substratum this material is abundant. The stony loam occupying more uneven country carries so much chert material that cultivation is difficult and even impracticable. The gravelly loam carries a large quantity of chert material, but the

size of the fragments is much smaller than in case of the stony loam. The Clarksville soils are all thoroughly drained, with the exception of small areas having a nearly level surface. They are also forested in their native condition with hardwood, principally oak and hickory.

The other limestone soils are confined to the prairie section, such as is extensively developed in the northern part of the county. The prairies are much smoother in character of surface than the forested section in which the Clarksville soils occur. Two important series are developed in the former—the Lebanon and Eldon. These differ principally in the color of the material, the Lebanon soils being characteristically gray in the surface, while the Eldon soils are dark brown to nearly black. Only one type of each series was recognized, the silt loam type.

The only type derived from sandstone is the Tilsit fine sandy loam. This has a brown or grayish-brown soil and yellowish-brown subsoil. The type is derived from the Bolin Creek sandstone.

The alluvial soils, comprising material washed from the uplands and deposited by streams along their flood plains, fall into two divisions, as follows: (1) The first-bottom or recent alluvium, occupying the overflowed bottoms of streams, and (2) the second-bottom or old alluvium, occupying stream terraces which were built when waters of the streams reached high levels.

The most extensive group of first-bottom soils is the Huntington series, which in this county is represented by the Huntington silt loam and fine sandy loam. These are brownish-colored soils, which show but little change in the character of material throughout the 3-foot section. A phase of the Huntington silt loam was mapped, which differs from the typical soil in having a light-gray subsoil.

The old alluvium or second-bottom soils have been placed in the Robertsville and Bagnell series. The former includes poorly drained gray soils, while the latter includes poorly drained black soils. The material entering into the composition of these terrace soils is composed largely of wash from the limestone uplands. This was laid down over the flood plains at an earlier stage in the development of the drainage valleys—that is, before the stream channels had been cut down to their present levels.

In the following chapters each soil type is described in detail and the agricultural value of the various soils is brought out.

The table following gives the names and extent of the several soil types found in Miller County.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Clarksville stony loam	200,000	52.7	Robertsville silt loam	3,712	0.9
Clarksville silt loam	84,672	22.3	Huntington fine sandy loam	1,856	.5
Huntington silt loam	34,240	9.3	Tilsit fine sandy loam	1,600	.4
Gray subsoil phase	960		Bagnell clay	1,600	.4
Eldon silt loam	25,536	6.7	Riverwash	128	.1
Lebanon silt loam	19,264	5.1	Total	379,520	
Clarksville gravelly loam	5,952	1.6			

ELDON SILT LOAM.

The Eldon silt loam consists of a light-brown to dark-brown, or in places nearly black, mellow silt loam, underlain at about 10 inches by a gray to grayish-yellow or yellowish-brown, friable silt loam to silty clay loam, which becomes heavier with depth and grades at about 15 to 18 inches into crumbly to moderately plastic silty clay, usually mottled gray and red. In places the mottled gray and red clay extends to the chert layer, while in others the red mottling gives way to yellow, the lower portion frequently being mottled gray and yellow. On some of the flat-topped ridges a layer of gray silt loam, ashy in appearance and feel, is sometimes encountered at lower depths. This is typical of some of the soil in the vicinity of Eldon, but the extent of such areas does not warrant mapping as a separate type. Under most of the type, usually at about 18 to 30 inches, is a layer of sharp, angular chert fragments mixed with a little reddish clay. This layer is locally known as "hardpan." Generally the cherty stratum approaches the surface toward the crest of the ridges, while with the descent of the slope its depth below the surface gradually increases. On the crest of the ridges the "hardpan" often outcrops, giving rise to the Clarksville gravelly loam, while along the lower slopes it is frequently not reached within the 3-foot section, sometimes lying as deep as 4 feet or more.

This type is prevailingly found on the gently rolling uplands, where little erosion has taken place. The slopes are gentle and smooth. This soil is formed through the decomposition of the Jefferson City limestone. It is found principally in the northern prairie region of the county, though small areas are found in the southern prairies, especially around Iberia.

The Eldon silt loam in the early days of settlement was covered with a thick growth of prairie grass. At the present time there are scattered clumps of elm, white oak, black oak, hickory, and walnut trees. In the smaller flora the iron weed, rag weed, and white daisy are conspicuous.

The Eldon silt loam is a very productive soil, being the best upland type in the county. Grass, wheat, corn, and oats are the leading crops in the order named. Wheat yields 15 to 25 bushels, corn 35 to 50 bushels, oats 30 to 40 bushels, and timothy 1½ to 2 tons of hay per acre. The differences in yield are due more to differences in management than to variations in the soil. The low yields are often the result of continued use of the land for one crop, such as corn. Within the last few years much more attention has been given to crop rotation. Most of the farmers are now using the following rotation: Wheat, one year; grass, two years; corn, one year; followed by oats, and back to wheat. Fertilizers are now being used with much success with wheat and corn.

The soil has a fairly high organic-matter content, but barnyard or stable manure is decidedly beneficial to crops. Live stock raising is an important industry on this type, as the land is well suited to the production of pasturage crops. The topography allows the use of improved farm machinery.

Land of this type of soil ranges in value from $40 to $75 an acre, with some lying near towns as high as $90 to $100. The farms as well as the buildings on this type usually are well taken care of, and in general show prosperity.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Eldon silt loam.

Mechanical analyses of Eldon silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
342701	Soil	0.0	2.4	1.4	1.7	2.5	71.5	20.4
342702	Subsoil	.0	1.4	1.0	1.9	2.2	59.0	34.3

CLARKSVILLE GRAVELLY LOAM.

The Clarksville gravelly loam consists of grayish silt loam underlain at 6 to 10 inches by pale-yellow silty clay carrying a large quantity of angular chert fragments. Chert fragments, varying in size from small chips to 3 inches in diameter, are present through the soil in sufficient quantity to interfere with cultivation. It is estimated that in most of this type from 25 to 50 per cent of the soil mass is made up of these fragments, while the subsoil frequently carries 75 per cent or more of them, being composed in places almost wholly of this material. When dry it is almost impossible to bore into the soil with an auger.

This soil occupies the slopes and crests of ridges. In some places a buff to red clay overlies either limestone or a layer composed

mainly of chert and limestone fragments. Outcrops of limestone are common. Such areas approach the character of a stony loam. In places Rough stony land also was included in the type, on account of the small size of the areas.

The Clarksville gravelly loam is found where erosion has been very active. The type is generally sharply rolling, though some areas on the crests of ridges are nearly level. The Clarksville gravelly loam is derived from a cherty layer of limestone.

Most of this type is timbered and but very little of it is under cultivation. The native forest consists chiefly of scrubby blackjack and post oak; of the smaller plants bluestem grass is characteristic. In the main the agricultural value of this type is low. It is best adapted to pasturage.

The type is mapped exclusively in the northern part of the county, being surrounded by the Eldon silt loam or Lebanon silt loam.

Where the rock fragments are not too numerous, corn yields from 15 to 25 bushels. This soil needs organic matter, such as can be supplied by plowing under crops like cowpeas and clover. It is usually sold with the other soils, but where sold alone, as in case of the large tracts, such as those in the northeastern part of the county, it brings from $5 to $8 an acre. It is used almost exclusively for pasture. Strawberries, cantaloupes, peaches, and Irish potatoes are successfully grown on this type of soil in other sections, particularly in Georgia and Tennessee.[1]

CLARKSVILLE SILT LOAM.

The Clarksville silt loam typically is a gray to grayish-brown or yellowish-brown, floury silt loam, underlain at 4 to 6 inches by pale-yellow or grayish-yellow silt loam, which quickly grades into light-buff or reddish-yellow, friable silty clay loam. In some cases, as on the steeper slopes, where erosion has been active, yellowish subsurface material either appears at the surface or is encountered at a depth of an inch or so. In some areas there is present a perceptible proportion of fine sand. Chert fragments are quite common on the surface and throughout the 3-foot section, but usually not in quantity sufficient to interfere with cultivation.

The subsoil proper ordinarily begins at 15 inches. It varies from pale-yellow, friable silt loam to silty clay loam in the upper part to buff, reddish-yellow or mottled yellow and gray, moderately crumbly silty clay loam or silty clay below. The lower portion often is more friable than the upper and often more silty. Black oxide of iron concretions are not uncommon in the subsoil. A layer consisting

[1] See soil survey report of Chattooga County, Ga.

chiefly of angular chert fragments embedded in reddish clay is encountered generally at depths ranging between 16 and 36 inches. This is locally styled "hardpan." This layer is almost impenetrable to plant roots, and it also impedes circulation of the soil moisture. Occasionally bedrock underlies the soil instead of the "hardpan" cherty layer. Here the surface soil is brown to dark brown, while the subsoil varies from a yellowish-brown to a red, plastic, heavy clay. These areas were too small to map or they would have been shown as a distinct type.

In general, the surface of this type is undulating to nearly flat. It occurs on the flat-topped ridges forming the divides between drainage systems. Along the sides of streams or drainage-way valleys the land is gently sloping to rolling. In the better drained areas the surface soil is more a grayish-brown and the subsoil more a reddish color, while in the more nearly level situations on the flat-topped ridges, where the drainage is frequently imperfect, the color is lighter, generally gray. Usually this type has satisfactory drainage.

The Clarksville silt loam is a residual soil derived from cherty limestone, principally of the St. Elizabeth and Gasconade formation. Occasionally sandstone is present, but this does not influence the soil to any important extent. Areas of stony loam too small to separate are included with this type.

On account of its mellow structure, this soil is easily worked. It is extensively cultivated, but there still remain some forested areas. The characteristic trees on this type are scrub oaks of different varieties, including post, blackjack, black oak, and white oak. Some hickory and a few walnut trees are present.

The Clarksville silt loam is considered a fair soil. The general appearance of the farms indicates a prosperous condition. Wheat produces from 10 to 15 bushels; corn, 20 to 40 bushels; oats, 20 to 30 bushels; and timothy from 1 to 2 tons per acre. The yields are most satisfactory in wet seasons. The type does not withstand drought well. It is best adapted to small grain and grass and affords good pasturage. Fruit trees do fairly well. The soil is decidedly deficient in organic matter, as is evidenced by its light color. All available stable manure should be applied to the fields. Cowpeas and clover should be grown more extensively, as the soil is materially improved by growing such crops. Tests indicate the necessity of applying lime, especially to land to be sowed in clover.

Improved lands of this type near the railroads or markets bring from $20 to $35 an acre; unimproved land distant from markets sells at $6 to $12 an acre.

CLARKSVILLE STONY LOAM.

The Clarksville stony loam is the most extensive soil of the county. It comprises rolling to hilly, broken, and rough, stony land. The fine material of this type is dominantly a grayish to yellowish-gray silt loam in the surface portion and a pale-yellow to buff or reddish-yellow silty clay loam to silty clay in the subsoil. The subsoil is often mottled with gray. The surface is so thickly strewn with chert fragments and these are so abundant through the soil body that cultivation is difficult or impracticable over the greater part of the type. Frequently from 40 to 75 per cent of the soil mass consists of these chert fragments, which range in size from small up to 1 to 2 feet in diameter. Areas of rough, stony land lie in strips along the bluffs of the creeks.

This type includes a good many small, scattered, glady areas or "balds." These are mostly confined to the narrow ridges. In these areas limestone frequently outcrops or comes very near the surface. Most of these glades are treeless or support only a sparse, scraggy growth of oak. The soil here is mostly a black clay loam or clay underlain at about 1 to 3 inches by a brown, reddish-brown, or red, plastic, heavy clay. There are some patches outside of the glades, especially on the lower slopes, where the subsoil is a brownish to red, heavy clay.

The Clarksville stony loam is the most extensive soil in Miller County. In the country bordering the Osage River and its tributaries it is the dominant soil. The rapid run-off of rain water has had much to do with the formation of this type of soil, the fine residual material from the parent rocks having been largely swept away. Occasional areas of silt loam are included with this soil, owing to their small size.

The topography is prevalently rough and broken. Ridges, hills, ravines, and hollows are so closely associated that few large areas can be said to represent smooth country. The land is too stony and broken for cultivation to any considerable extent. Small patches are used for corn, which does fairly well in wet seasons but suffers severely in dry spells.

The Clarksville stony loam is derived from a very cherty limestone. While stones are found over the entire area, they are more abundant over the rougher country, especially nearer the Osage River and other large streams.

The forest growth is rather scrubby, though large areas are found which support a growth of heavy oak, hickory, and some walnut. Very little of this land has been cleared, as it has little agricultural value except for pasturage. The lumber industry has been one of great importance on this type. Crossties and lumber for various

purposes have been cut from the forests in large quantities, most of the good timber having been removed.

This type is best adapted to the production of grass and pasturage. Bluegrass, bluestem, and Japan clover (lespedeza) grow well and cover the surface even over the rough and rocky slopes. Until the last few years, free range was available and thousands of head of cattle, hogs, and sheep were raised on the open range of the woods with practically no attention. Stock laws have been passed and most of the land is now under fence. The quality of the cattle has improved under the new conditions.

Land of this type should be used for pasture for cattle, sheep, and hogs during the spring, summer, and fall, the stock being shipped to sections more favorably situated for feeding. This practice is followed extensively in some parts of the county to-day.

On the better areas corn yields from 10 to 20 bushels, and timothy and clover from one-half to 1 ton of hay per acre. Several apple orchards have been set out and the trees have made a thrifty growth. The success of orcharding is still uncertain, however, as the climate is not especially well adapted to fruit growing.

Lands of this type of soil sell for $2 to $10 an acre. Farm buildings on this type are generally of low cost.

LEBANON SILT LOAM.

The Lebanon silt loam in its typical development consists of a friable gray to grayish-brown or yellowish-brown floury silt loam, underlain at 6 to 8 inches by brownish-yellow to reddish-yellow or light-buff friable silty clay loam. This quickly grades into a reddish-yellow or buff crumbly silty clay, which at lower depths is usually mottled with yellow and gray. In places, especially in the lower, poorer drained areas, the subsoil is mottled yellow and gray throughout and often contains black and brown oxide of iron concretions. A tough "hardpan" layer consisting largely of sharp angular chert mixed with reddish clay is generally encountered at depths ranging from 18 to 30 inches below the surface. This layer is nearer the surface along the upper slopes and deeper on the lower slopes, where it sometimes is not reached within the 3-foot section. Occasionally fragments of sandstone are present on the surface and some sandy areas are found.

The average depth of the surface soil is about 6 inches, but around the heads of draws, where washed-in material has accumulated, it extends 15 or 18 inches. The clay of the lower subsoil is tough and impervious to water. This "hardpan" layer is quite resistant to the penetration of plant roots. A few chert fragments are often encountered before the "hardpan" layer is reached. The soil is inclined to wash severely.

The Lebanon silt loam occurs in the northern part of the county, on the more rolling broken slopes, where it extends in a continuous belt across the county. The surface drainage is good to excessive. The soil is derived mainly from the Jefferson City limestone.

The Lebanon silt loam is not quite so productive as the Eldon silt loam, though with proper methods of management, including crop rotation, the growing of leguminous crops, the liberal use of fertilizers and stable manure, the soil can be put in a good state of productiveness. It is very low in organic matter and is markedly benefited by growing and occasionally plowing under such crops as clover and cowpeas. Much of the land is in pasture. The soil is best adapted to the production of grasses.

From the general appearance of the fields and buildings the condition of the farmers on this type is generally satisfactory.

Grass, wheat, corn, and oats, named in the order of their importance, are the principal crops. Wheat yields 15 to 20 bushels; corn, 25 to 50 bushels; oats, 20 to 40 bushels; and timothy from 1½ to 2 tons of hay per acre. The land is valued at $25 to $40 an acre.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Lebanon silt loam:

Mechanical analyses of Lebanon silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
342709	Soil	1.1	1.4	1.0	1.5	1.7	78.9	14.2
342710	Subsoil	.5	1.1	.6	1.2	2.5	69.8	24.2
342711	Lower subsoil	.9	1.2	.6	1.4	4.2	63.8	27.5

TILSIT FINE SANDY LOAM.

The Tilsit fine sandy loam occurs as small areas in the southeastern part of the county. It consists of a brown to grayish-brown or dark-brown fine sandy loam, underlain at 8 or 10 inches by yellowish-brown friable heavy fine sandy loam to fine sandy clay loam, which in turn rests at about 15 to 24 inches on a friable fine sandy clay of a buff or reddish-yellow color. Small fragments of sandstone are common on the surface, and to a greater extent in the subsoil. There are a good many patches in which the lighter colored subsoil material comes sufficiently near the surface to be turned up with ordinary plowing. This gives freshly plowed fields a spotted appearance of brown and yellowish brown. Some chert fragments are mingled with the soil or subsoil or both near the line of contact with the Clarksville soils.

The material is derived directly from a medium to fine-grained sandstone (the Bolin Creek sandstone). Material washed down from limestone soils on higher slopes has locally influenced some areas. This soil is typically found on valley slopes, and has a rolling to undulating topography. The soil washes easily. The clay subsoil and in places sandstone rock are seen at the surface. Owing to the porosity of the soil it is well drained and warms up early in the spring. The type is partly forested with oak, blackjack being prominent, and hickory. It was originally all in forest.

The Tilsit fine sandy loam is not a very productive soil, though most of it is under cultivation. It needs humus, and the growing of leguminous crops should be carried on, and occasional crops of clover or cowpeas should be turned under. It is farmed principally to corn and wheat; corn yields from 25 to 40 bushels and wheat 6 to 15 bushels per acre. Grass does fairly well, but not much live stock is raised on this soil at present. This is the poorest type of upland soil in the county. Owing to its warmth and good drainage, it should be a good trucking soil, but it is not used for this purpose at present.

From the general appearance of the farms the agricultural conditions are below the average. Farms sell for $10 to $25 an acre.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of this type:

Mechanical analyses of Tilsit fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
342706	Soil	0.3	4.5	13.1	29.4	4.8	41.8	6.0
342707	Subsoil	.1	3.3	10.2	22.3	4.8	44.2	14.9
342708	Lower subsoil	.3	3.5	12.8	27.4	4.1	33.4	18.2

The following sample contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 342706, 2.84 per cent.

HUNTINGTON SILT LOAM.

The Huntington silt loam to a depth of about 12 to 20 inches consists of a medium to dark-brown, mellow silt loam, underlain by somewhat lighter colored or yellowish-brown silt loam. The lower subsoil, that below a depth of about 26 to 30 inches, is often variable, ranging from silt loam through silty clay loam to fine sandy loam. The darker color is found in the lower lying areas, where organic matter has accumulated.

This type comprises the rich, fertile bottom lands along the streams of the county. The surface is flat, with a generally slight slope toward the stream. It typically occupies first bottoms, though a few terrace remnants are included with the type on account of their small

extent. The type is subject to overflow. Between overflows the land is well drained, except in local depressed areas, which would be benefited by artificial drainage. As a rule, the water table lies at a depth greater than 4 feet.

The Huntington silt loam is distinctly alluvial, the material having been carried down from the uplands and deposited by the streams in times of overflow. Each flood adds new material, which tends to maintain the productiveness of the type.

At present most of the Huntington silt loam is cleared and under cultivation. In many parts of the county (especially along the smaller tributaries of the Osage River) this type constitutes practically all the tillable land. The original forest consisted of hickory, black walnut, sugar maple, ash, sycamore, water oak, butternut, bur oak, papaw, chinquapin oak, birch, and cottonwood. Black walnut and sycamore are still found along the streams.

The Huntington silt loam is the most productive soil of the county. The first settlements were made along the streams on this type, and the clearings are still farmed. The land has been well cared for. It is the best corn and wheat soil of the county.

Very little attention is given to crop rotation on this type and fields that have been in corn for 40 to 50 years yield from 45 to 60 bushels an acre at the present time. The average yield of corn is 45 bushels, though some fields run from 80 to 90 bushels per acre. Timothy and clover hay yields from 2 to 2½ tons of hay per acre. This is a good alfalfa soil, where not subject to prolonged overflow. The only alfalfa noticed in the county was on this soil. Wheat yields from 18 to 25 bushels per acre. This type withstands drought better than the other bottom soils. Good crops of corn and grass can be produced with very little rainfall.

The common weeds on this soil are morning-glory, cockleburs, smartweed, and nettles. These are very troublesome, often crowding out grass in the mowings.

The Huntington silt loam is found chiefly along the Osage and its tributaries, where the areas vary from about one-half to one and three-quarters miles in width. There are many strips only a few yards wide along the smaller streamlets. These could not be shown on the scale used. Along the smaller streams the material is somewhat more variable, carrying more sand than in case of the type as developed in the wider bottoms of the large streams.

The Huntington silt loam varies in valuation, ranging from $40 to $90 an acre; the average price is about $60.

Huntington silt loam, gray subsoil phase.—A phase of the Huntington silt loam was mapped which differs from the typical soil in having a lighter colored subsoil. This phase consists of a brown silt loam, underlain at 8 to 10 inches by gray to nearly white silt loam to

silty clay loam. The lower subsoil is generally a gray to drab silty clay loam, containing iron concretions of black, red, and yellowish color. The soil is fairly loose and easily cultivated.

This soil occurs in rather poorly drained situations in the first bottoms of streams. The material of the surface soil is identical with the corresponding portion of the typical Huntington silt loam, but the subsoil material has the character of the subsoil of the Holly silt loam.[1]

This is a fairly productive soil, but it is not the equal of the typical portion of the type, the underdrainage being less favorable. Corn, wheat, and grass do well. Corn produces 40 to 50 bushels; wheat, 18 to 20 bushels; grass, 2 to 2½ tons. This land sells for $5 to $55 an acre.

HUNTINGTON FINE SANDY LOAM.

The Huntington fine sandy loam consists of a medium-brown to dark-brown fine sandy loam, usually slightly heavier in texture at about 5 or 6 inches. At depths approximating 20 inches the material becomes lighter in color and texture, and sometimes passes into sandy loam. The type includes patches of sandy loam and gravelly loam which were not separated, on account of their small size or intricate association with the main type.

Most of the Huntington fine sandy loam occurs as slight elevations or natural levees along the stream front and is subject to overflow. It is well drained and easily cultivated. This type is not extensive. It produces good crops of corn, small grains, and clover. It is best suited to truck farming. Melons and tomatoes will give especially good results. As a rule, it is high in organic matter. This is considered one of the most productive bottom soils. The average valuation is $50 to $60 an acre.

ROBERTSVILLE SILT LOAM.

The Robertsville silt loam consists of 8 to 10 inches of light-gray to almost white silt loam, underlain by a nearly white silty clay loam mottled faintly with yellowish brown. Often at about 30 inches the material consists of gray to drab silty clay. This portion is also mottled and contains many concretions. The soil is fairly loose and easily put in good tilth, but becomes compact after lying uncultivated for some time. Black oxide of iron concretions are often found on the surface and throughout the soil. These areas are locally called "buckshot land." This type is also locally termed "crawfish land."

The Robertsville silt loam occurs on poorly drained terraces or second bottoms, standing usually about 6 to 10 feet above the

[1] The Holly silt loam is the gray equivalent of the Huntington silt loam. The type was not sufficiently extensive to map in this county.

first bottoms. It is most extensive along the Osage and some of its larger tributaries. This soil is also found in "cutoffs" of old streams, as, for instance, around Lost Hill, along Big Tavern Creek.

The Robertsville silt loam has a nearly level surface, and the general drainage is poor on account of the impervious subsoil and little slope. The boundary between this soil and the first-bottom soils is very distinct, being marked usually by an abrupt drop or bluff.

This type owes its origin to deposits carried and laid down by streams along which it is found when they flowed at a higher level than at present. Some of the material, especially along the outer edges, probably has been brought down from the adjoining hills by surface water and seepage.

The Robertsville silt loam has been cleared of trees and put under cultivation. The native forest was mainly walnut, oak, hickory, and sycamore.

This is an excellent soil for the production of grass, but much of it is too poorly drained for corn. The soil is much in need of drainage and lime. It is not subject to overflow, except in case of some of the lower areas, which may be inundated during extremely high water. Timothy yields from 2 to 2½ tons of hay per acre. Wheat yields from 12 to 20 bushels per acre. Corn does not do so well and on many fields shows a stunted growth. It yields from 25 to 60 bushels per acre. For the improvement of this soil the addition of organic matter, tile drainage, and the application of lime are the important steps. At present this type is utilized for the growing of forage crops. Farm machinery can be used on most of the areas. The land sells for $35 to $50 an acre.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of this type:

Mechanical analyses of Robertsville silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
342716	Soil	0.3	1.1	0.8	1.1	1.0	81.5	14.0
342717	Subsoil	.6	2.3	.9	.9	1.6	74.9	18.8
342718	Lower subsoil	.9	1.3	.6	.7	1.1	66.4	28.9

BAGNELL CLAY.

The Bagnell clay consists of a black, tenacious and plastic clay, underlain at a depth ranging from 15 to 30 inches by drab to bluish-black plastic clay, faintly mottled with yellowish-brown. The soil when wet is very plastic. When dry it becomes very hard, and large cracks form in the surface. It is rather difficult soil to work.

This type is locally called "gumbo." It characteristically occupies poorly drained depressions or swales on stream terraces (second bottoms), and in some instances is found in abandoned stream ways. The material consists of old alluvium derived from limestone and sandstone soils. In its typical development this soil stands sufficiently above the first bottom to be out of the reach of overflows, at least, of normal overflows. Part of it is subject to inundations at times; with inadequate drainage outlets the soil in its natural condition is quite poorly drained. This condition has favored the accumulation of dark-colored organic matter. The heavy, rather impervious subsoil impedes the downward movement of water. By ditching and tiling good drainage can be established.

Little of this soil is under cultivation. It is well suited to a number of grasses. With better drainage good crops of corn could be grown. As it is the crop does well in dry years. There is very little Bagnell clay in the county.

The following table gives the results of mechanical analyses of the soil and subsoil:

Mechanical analyses of Bagnell clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
342721	Soil	0.3	0.5	0.3	0.8	1.1	69.2	27.3
342722	Subsoil	.2	.5	.3	.5	.9	65.6	31.7

RIVERWASH.

Riverwash includes gravelly material lying along the banks or occurring in the beds of streams. As mapped in this county the material consists chiefly of sharp, angular chert, often slightly waterworn, and varying in size, mixed with more or less rounded chert gravel and some sand and silt. In its present condition such material is of little agricultural value, or is altogether valueless.

SUMMARY.

Miller County lies in the south-central part of Missouri, well within the Ozark region. It has an area of 593 square miles, or 379,520 acres.

The topography varies from undulating to roughly rolling. There are two main belts—the rolling uplands or prairies and the roughly rolling country or "breaks."

The greater part of the county is drained by the Osage River and its tributaries. The northern part is drained by the Moreau.

Eldon is the principal town and Tuscumbia is the county seat. Iberia is the second largest town and serves as a distributing point for the larger part of the county south of the Osage River.

The county was settled in the early part of the nineteenth century, the first settlers coming from Tennessee and Kentucky. The population in 1910 was 16,717, an increase of 10 per cent in 10 years.

The climate is moderate; the winters are open, and cold weather continues for only a few days. There is an average growing season of 179 days, which is sufficient for the maturing of all general farm crops.

The Chicago, Rock Island & Pacific Railroad and the Missouri Pacific (Bagnell Branch) traverse the northern part of the county, while the part south of the Osage River has no railroad facilities except in those sections within the reach of the Frisco Railroad passing through the adjoining counties on the south. All parts of the county have rural free delivery of mail and most all parts are reached by telephone.

Stock raising was the first agricultural pursuit, as the free range afforded good grazing.

Stock raising and breeding is still an important industry on the bottom lands, but there is not enough corn produced to feed the cattle, and many are shipped out in the fall to market or driven into the northern counties to be fed. The abundance of grass makes this industry important in the rough, broken country. Hogs are also raised and then shipped out to be fed.

Corn is the chief crop for the county as a whole, with wheat a close second, followed by hay, oats, and cowpeas, ranking in importance in the order named.

Some attention is being given to the production of fruit. The soils are well adapted to the apple and climatic conditions are particularly favorable.

Much of the county is forested. Of the rough, broken land 75 to 85 per cent supports a forest growth. Ties, rough lumber, posts, and cordwood are shipped. The tie and lumber business has for years been one of the principal sources of income, but is fast giving way to agriculture.

The value of land varies from $3 an acre for the rough, stony land to from $60 to $90 for areas in the northern prairie section and in the Osage River bottoms. The average size of farms is about 125 acres.

The agricultural conditions of the county have shown a marked improvement in recent years. Better methods of farming are being practiced, better farm buildings constructed, and modern implements purchased. The soils as a rule lack organic matter, and some are in need of drainage and liming.

The upland soils are the result of the weathering of cherty, bedded rock formations. The rocks are principally limestone, with occasional areas of sandstone, and in the southeastern part of the county

enough sandstone is present to give rise to a sandy loam soil. These upland soils are all residual. Areas of alluvial soils are found along the watercourses.

Ten soil types, excluding Riverwash, were mapped in the county.

The Clarksville series is represented by the gravelly loam, stony loam, and silt loam. The gravelly loam and stony loam are not farmed to any extent. Both these are forested, but are well adapted to pasturage. They are both rolling and broken and excessively drained. The silt loam occupies the flat-topped ridges and more gentle slopes. This is a fair soil.

The Lebanon series comprises the Lebanon silt loam. This soil is largely under cultivation. With proper methods of farming the soil can be built up, and most of it is now in a good, productive condition.

The Eldon silt loam is the most valuable upland soil, though not the most extensive. It occupies the northern prairies. It is gently rolling and well drained. It is extensively farmed on account of its level surface and proximity to a railroad.

The Tilsit fine sandy loam is derived from the Bolin Creek sandstone, which is only found in small areas in the southeastern part of the county. This is not a very productive soil. It washes rather easily. Corn and wheat do fairly well.

The Huntington silt loam is a first-bottom soil, and is the most productive of the valley soils. It is subject to overflow, but is otherwise well drained. The Huntington silt loam, gray subsoil phase, is also a first-bottom soil, but better drained than the Robertsville. It has a surface soil similar to the Huntington silt loam, and subsoil similar to the Robertsville silt loam. It is a productive soil, well adapted to corn and wheat.

The Huntington fine sandy loam is a first-bottom soil, occurring as a natural levee along the stream or upon low ridges in the bottoms. It is well adapted to truck farming. Potatoes and the general farm crops do well.

The Bagnell clay is a black alluvial soil. It is found in low depressions or swales. This is a good grass and corn soil, but as a rule it is poorly drained.

The Robertsville silt loam is a bench-land or second-bottom type. It is fairly productive and well adapted to timothy. It needs drainage and lime.

Riverwash has no agricultural value.

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[PUBLIC RESOLUTION—NO. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture"

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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U. S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
MISSOURI
MILLER COUNTY SHEET

UNIVERSITY OF MISSOURI
AGRICULTURAL EXPERIMENT STATION
F. B. MUMFORD DIRECTOR

SOIL PROFILE
(3 feet deep)

Clarksville stony loam — Sil / Ch
Clarksville gravelly loam — Sicl / Ch
Clarksville silt loam — Sil / Sicl / C
Huntington fine sandy loam — Fsl / Fal
Huntington silt loam — Sil / Sil to Fal
Gray subsoil phase — Sil / Sil / Sicl
Eldon silt loam — Sil / Sicl / C / Ch
Lebanon silt loam — Sil / Sicl / C / Ch
Tilsit fine sandy loam — Fsl / Scl / Sc
Robertsville silt loam — Sil / Sicl / Sic
Bagnell clay — C / C

LEGEND
Sil —Silt loam
Sicl—Silty clay loam
C —Clay
Fsl —Fine sandy loam
Scl—Sandy clay loam
Sc —Sandy clay
Ch —Chert fragments
Sic —Silty clay

LEGEND
Clarksville stony loam — Cs
Clarksville gravelly loam — Cg
Clarksville silt loam — Cl
Huntington fine sandy loam — Hf
Huntington silt loam — Hs
Gray subsoil phase — Hs
Eldon silt loam — Es
Lebanon silt loam — Ls
Tilsit fine sandy loam — Tf
Robertsville silt loam — Rs
Bagnell clay — Bc
Riverwash — R

Hugh H. Bennett, Inspector Southern Division
Soils surveyed by H. G. Lewis of the University of Missouri
and F. V. Emerson of the U. S. Department of Agriculture

1 ½ 0 1 2 3 4 Miles
Scale 1 inch-1 mile

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1912